REMARKS/ARGUMENTS

Favorable reconsideration of this application in view of the above amendments and in light of the following discussion is respectfully requested.

Claims 1-6, 8-18, and 20-24 are pending, with Claims 11-18 and 20 being withdrawn from consideration. Claims 1, 2, 10 and 21 are amended; Claim 19 is canceled without prejudice or disclaimer, and Claims 22-24 are newly submitted. No new matter is introduced.[1]

The Office Action objected to Claim 10. In addition, Claims 1-6, 10, and 19 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fairbairn (U.S. Patent No. 5,838,121) in view of Suzuki (U.S. Patent No. 5,522,934); and Claims 8, 9, and 21 were rejected under 35 U.S.C. § 103(a) as unpatentable over Faibairn and Suzuki in view of Lee (U.S. Patent No. 6,086,679).

The Office Action objected to Claim 10 for the deletion of the word "claims." Amended Claim 10 adds the word "claim," as suggest in the Office Action. Accordingly, it is submitted that amended Claim 10 is in proper form, and it is respectfully requested that the objection to Claim 10 be withdrawn.

Independent Claim 1 recites a processing apparatus that includes a monatomic nitrogen atom supply unit for providing dissociated monatomic nitrogen atoms in processing chambers. Amended Claim 1 recites that the monatomic nitrogen atoms are provided in each processing chamber after finishing processing the substrate therein to remove charge on an electrostatic chuck provided in each processing chamber and that *the monatomic nitrogen*

[1] See the specification as originally filed at page 22, line 21 to page 23, line, for example, and at page 13, line 13 to page 14, line 8, for example.

atoms are dissociated before entering each processing chamber. The monatomic nitrogen atom supply unit includes a pipe communicating with each processing chamber *through a sidewall* of each processing chamber. Amended Claim 1 further recites that a height at which the pipe communicates with each processing chamber *is substantially equal to a height of the electrostatic chuck* provided in each processing chamber.

Independent Claim 2 recites a processing apparatus that includes a monatomic nitrogen atom supply unit for providing dissociated monatomic nitrogen atoms in a processing chamber. Amended Claim 2 recites that the monatomic nitrogen atoms are provided in the processing chamber after finishing processing the substrate therein to remove charge on the electrostatic chuck provided in the processing chamber and that *the monatomic nitrogen atoms are dissociated before entering the processing chamber.* The monatomic nitrogen atom supply unit includes a pipe communicating with the processing chamber *through a sidewall of the processing chamber.* Amended Claim 2 further recites that a height at which the pipe communicates with the processing chamber *is substantially equal to a height of the electrostatic chuck* provided in the processing chamber.

Independent Claim 21 recites a processing apparatus that includes means for providing dissociated monatomic nitrogen atoms in a processing chamber. Amended Claim 21 recites that the monatomic nitrogen atoms are provided in the processing chamber after finishing processing the substrate therein *and the monatomic nitrogen atoms are dissociated before entering the processing chamber.* The means for providing dissociated monatomic nitrogen atoms includes a pipe communicating with the processing chamber *through a sidewall of the processing chamber.* Amended Claim 21 further recites that a height at which

the pipe communicates with the processing chamber *is substantially equal to a height of the electrostatic chuck* provided in the processing chamber.

None of the cited references, either alone or in combination, disclose or suggest a monatomic nitrogen atom supply unit or a means for providing dissociated monatomic nitrogen atoms in a processing chamber that (1) dissociates nitrogen atoms *before entering a process chamber*, (2) communicates with a processing chamber *through a sidewall of the processing chamber*, and (3) in which the pipe that communicates with the processing chamber to deliver the dissociated atoms *is substantially equal to a height of the electrostatic chuck* provided in the processing chamber.

Turning to the applied references, Fairbairn describes an apparatus for concurrent processing of multiple wafers in the fabrication of integrated circuits. Figures 23 and 24 illustrate a remote clean module 800 connected to a process chamber 106. The clean module 800 includes a source of a precursor gas 804, a remote activation chamber 806 which is located outside of a processing chamber 106, a power source 808 for activating the precursor gas within the remote activation chamber, an electronically operated valve and flow control mechanism 810, and a conduit or pipe 812 connecting the remote chamber to the processing chamber via a conduit 811.[2] However, Fairbairn does not describe a *monatomic nitrogen atom* supply unit that includes a pipe communicating with a processing chamber through a *sidewall* of the processing chamber, an N_2 gas supply source for supplying an N_2 gas through the pipe, and an energy supply unit for applying energy to the N_2 gas in the pipe to convert the N_2 gas into dissociated monatomic nitrogen atoms. As can be seen in Figure 24, the conduit 811 communicates with the *upper portion* of the processing chamber 106. Thus,

[2] See Fairbairn, at col. 18, lines 16-24.

Fairbairn does not disclose a pipe communicating with a processing chamber through a *sidewall* of the processing chamber and monatomic nitrogen atoms provided in the chamber.

Lee fails to cure the deficiencies in Fairbairn. Figure 6 of Lee illustrates a transport polymerization system 600 employing RF to generate a plasma.[3] Precursors are stored in a precursor holder 604, are transported via a pipe 608 and through a liquid injector for liquid precursors, or a mass flow controller 612 for gases, then are transported via another pipe 616 into a plasma tube 620.[4] Precursors are exposed to RF energy generated by a RF generator 626, through a coil 628, and a plasma 630 is thereby generated.[5] The plasma 630 then flows into a deposition chamber 634 which is surrounded by a heater 638.[6] However, as can be in Figure 6, the plasma tube 620 is connected to a *top wall* of the deposition chamber 634. Accordingly, Lee does not suggest that monatomic nitrogen atoms are supplied from *a sidewall* of the chamber.

Suzuki fails to cure the deficiencies in Lee and Fairbairn. Suzuki relates to a plasma processing apparatus. Figure 2 of Suzuki illustrates a process vessel 4 that includes supply nozzle means 34 that includes three horizontally extending nozzles 34A, 34B, and 34C.[7] Suzuki describes that the gases supplied from the nozzle means 34 are process gases, i.e., SiH_4, Ar and O_2.[8] Indeed, Suzuki describes that plasma is generated (and thus the gases are dissociated) *in the vessel 4*. By contrast, independent Claims 1, 2, and 21 recite that the monatomic nitrogen atoms are dissociated *before entering the processing chamber*.

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[3] See Lee, at col. 24, lines 65-66.
[4] See Lee, at col. 24, line 66, to col. 25, line 5.
[5] See Lee, at col. 25, lines 5-7.
[6] See Lee, at col. 25, lines 7-9.
[7] See Suzuki, at col. 5, lines 7-35.
[8] See Lee, at col. 6, lines 10-28.

Further, none of the cited references suggest that a pipe that communicates with the processing chamber to deliver dissociated atoms *is substantially equal to a height of the electrostatic chuck* provided in the processing chamber. As noted above, the Fairbairn describes a conduit 811 that communicates with an *upper portion* of the processing chamber 106, and Lee describes a plasma tube 620 that is connected to a *top wall* of the deposition chamber 634. Moreover, as discussed above, the nozzle means 34 do not supply monatomic nitrogen atoms are dissociated *before entering the processing chamber*. However, even if the nozzle means 34 are identified as the claimed pipe, as can be seen in Figure 2 of Suzuki, the nozzle means 34 are not *substantially equal to a height of the electrostatic chuck* provided in the processing chamber.

Accordingly, even the combined teachings of Fairbairn, Lee, and Suzuki fail to disclose or suggest all of the features of independent Claims 1, 2, or 21. It is submitted that independent Claims 1, 2, and 21 and the claims depending therefrom are in condition for allowance.

New Claims 22-24 recite further features that are not suggest by the cited references. New independent Claim 22 recites a processing apparatus that includes, *inter alia*, a transfer chamber, one or more processing chambers, a transfer mechanism, and a monatomic atom supply for providing dissociated monatomic nitrogen atoms in the processing chambers. The monatomic nitrogen atoms are provided in each processing chamber *after finishing processing the substrate therein* to remove charge on the electrostatic chuck provided in each processing chamber. The monatomic nitrogen atom supply unit includes *an ultraviolet irradiation unit* for irradiating ultraviolet ray to N_2 gas *provided in said each processing chamber*, *a power supply* for supplying a power to the ultraviolet irradiation unit, and *a*

controller for controlling the power supply. The ultraviolet irradiation unit is provided *at a sidewall* of each processing chamber such that the ultraviolet irradiation unit is positioned close to the electrostatic chuck.

Turning to the applied references, Figure 4 of Lee illustrates a schematic diagram of a transport polymerization system 400 that uses electromagnetic radiation as an energy source for cracking precursor molecules.[9] Lee describes that precursors are transported from a precursor tank 404 through a pipe 408 and through a mass flow controller 412 through another pipe 416 and into a tube 420 which is transparent to the types of electromagnetic radiation to be used. infrared, ultraviolet and vacuum ultraviolet is irradiated to a gas in a tube 420.[10] However, Lee fails to disclose or suggest that ultraviolet ray is irradiated to an N_2 gas provided *in a processing chamber*, as recited in Claim 22.

Neither Fairbairn nor Suzuki cure the deficiency in Lee. Indeed, neither Fairbairn nor Suzuki disclose or suggest a monatomic nitrogen atom supply unit including *an ultraviolet irradiation unit* for irradiating ultraviolet ray to N_2 gas *provided in a processing chamber*, *a power supply* for supplying power to the ultraviolet irradiation unit, and *a controller* for controlling the power supply. Moreover, none of the cited references disclose or suggest that an ultraviolet irradiation unit is provided *at a sidewall of a processing chamber* such that the ultraviolet irradiation unit is positioned close to the electrostatic chuck.

Accordingly, none of the cited references, either alone or in combination, disclose or suggest the features of independent Claim 22. It is submitted that independent Claim 22 is in condition for allowance.

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[9] See Lee, at column 20, lines 51-53.
[10] See Lee, at column 20, lines 53-58.

New Claims 23 and 24 depend from new independent Claim 22 and recite further features that are suggested by the cited references. As discussed above, Claim 22 is believed to be in condition for allowance. Accordingly, Claims 23 and 24 are believed to be in condition for allowance for at least the same reasons as independent Claim 22, from which they depend.

For the reasons discussed above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance for Claims 1-6, 8-18, and 20-24 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better condition for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

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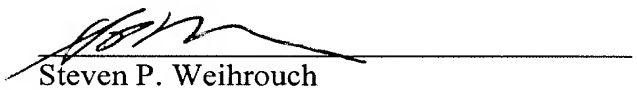

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